

Machine Learning based data analytics for IoT enabled Industry Automation

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ABSTRACT

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The main aims of this projects to the replacement of old communication that uses wired links with new communication that is wireless communication. The main reason to move to wireless communication is to improve the mobility, reduce the deployment cost, reduce cable damage and to improve the scalability. The current industrial revolution is the 4.0 industrial revolution which combines different technologies such as Internet of Things (IOT), robotics, virtual reality and artificial intelligence. The current industrial revolution is the 4.0 industrial revolution which combines different technologies such as Internet of Things (IOT), robotics, virtual reality and artificial intelligence. The current industrial revolution is the 4.0 industrial revolution which combines different technologies such as Internet of Things (IOT), robotics, virtual reality and artificial intelligence. The second aim of this project is to connect devices to IOT so as to improve the accessibility of the industry from anywhere in the world. These services are known as Best Effort services.

Keywords: Internet of Things, Robotics, Virtual Reality, Artificial Intelligence

I. INTRODUCTION

The current industrial revolution is the industry 4.0. One of its main aims is the replacement of old communication that uses wired links with new communication that is wireless communication. The main reason to move to wireless communication is to improve the mobility, reduce the deployment cost, reduce cable damage and to improve the scalability. To do this, the type of industrial application needs to be taken into consideration. The proposed communication protocol must support low loss rate and must be robust. This is one of the main challenges faced by industrial automation due to interference

with other communication devices and reflection with metallic objects in industries. The current industrial revolution is the 4.0 industrial revolution which combines different technologies such as Internet of Things (IOT), robotics, virtual reality and artificial intelligence. The second aim of this project is to connect devices to IOT so as to improve the accessibility of the industry from anywhere in the world. Apart from communication protocol and IOT, the other services running simultaneously are web browser, email, video or other services. These services are known as Best Effort services. So this communication protocol not only improves power

efficiency of the sensors but also it runs the Best Effort services.

The proposed project use machine learning to analyze and monitor the output data of the smart devices to investigate if this data is real data or fake. IOT connect anything on the internet using a specified protocol with sensors, devices, equipment to transfer the information & to communicate among devices intelligently to achieve smart monitoring and administration.

II. LITERATURE

1. This paper introduces a new infrastructure based on machine learning to analyze and monitor the output data of the smart meters to investigate if this data is real data or fake. The fake data are due to the hacking and the inefficient meters.

2. Smart Factory makes a solution which, due to the system's automated procedures, uncomplicated setup including simple, need-based installation, and, ultimately, high degree of scalability, can help companies in the manufacturing sector further optimize their processes and significantly boost their internal efficient Industrial Automation using Zigbee Communication Standard.

3. The main objective of this paper is to derive the statistical information about gas leakage and send it through mail so that we can acquire data from anywhere without human interaction. The IEEE 802.15.4 covers the physical layer and the MAC layer of low rate WPAN[5]. It is feasible to construct a WSN for emergency response notification using IEEE 802.15.4 and ZIGBEE.

III. MODULES

1. ARM Microcontroller

The system consists of the coordinator as ARM9. It is connected to the user network through the TCP/IP. This coordinator module is responsible for collecting the data from the sensor nodes and for real time monitoring. This subsystem has identified the parameters such as Temperature, smoke and Gas.

2. ZigBee Transmitter

This sub system transmit the status of each devices using ZigBee technology and signal is sent to SBMCU.

3. ZigBee Receiver

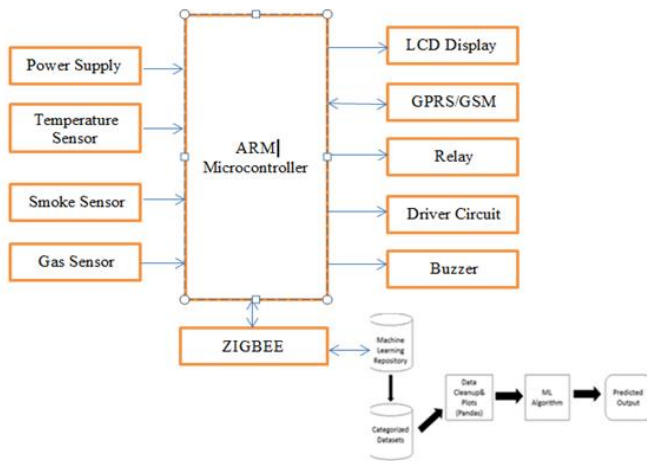
This sub system receives the status of each devices using ZigBee technology and signal is sent to SBMCU. The ZigBee transmitter and Receiver are responsible for communication between computer and the proposed industrial automation system.

4. Implementing machine learning algorithm

The developed algorithm can detect data loss due to unstable internet signals. The online output of the system, like data loss, real, and fake data, are presented in the dashboard of the IoT.

5. Smart automation Monitoring and Control Unit

The details like LDR value, Temperature, Smoke and Gas values etc., and status of the intelligent automation is displayed on the smart monitoring and control unit interface.



ARM MICROCONTROLLER

The Renesas RA4M3 group of 32-bit microcontrollers (MCUs) uses the high-performance Arm® Cortex®-M33 core with TrustZone. In concert with the secure crypto engine, it offers secure element functionality. The RA4M3 is built on a highly efficient 40nm process and is supported by an open and flexible ecosystem concept—the Flexible Software Package (FSP), built on FreeRTOS—and is expandable to use other RTOSes and middleware. The RA4M3 is suitable for IoT applications requiring vast communication options, future proof security, large embedded RAM, and low active power consumption down to 119µA/MHz running the CoreMark® algorithm from Flash.

TEMPERATURE SENSOR

The LM35 Temperature Sensor provides the Analog Temperature Data to ADC0804, which it converts into Digital Values and sends to 8051. Upon receiving the digital values, the 8051 Microcontroller performs a small calculation and then displays the temperature on the LCD.

SMOKE SENSOR

The LM35 Temperature Sensor provides the Analog Temperature Data to ADC0804, which it converts into Digital Values and sends to 8051. Upon receiving the digital values, the 8051 Microcontroller performs a small calculation and then displays the temperature on the LCD.

IV.CONCLUSION

LCD DISPLAY

Display units are the most important output devices in embedded projects and electronics products. 16x2 LCD is one of the most used display unit. 16x2 LCD means that there are two rows in which 16 characters can be displayed per line, and each character takes 5X7 matrix space on LCD. In this tutorial we are going to connect 16X2 LCD module to the 8051 microcontroller (AT89S52). Interfacing LCD with 8051 microcontroller might look quite complex to newbies, but after understanding the concept it would look very simple and easy. Although it may be time taking because you need to understand and connect 16 pins of LCD to the microcontroller. So first let's understand the 16 pins of LCD module. We can divide it in five categories, Power Pins, contrast pin, Control Pins, Data pins and Backlight pins.

GPRS/GSM

A GSM GPRS Module is used to enable communication between a microcontroller (or a microprocessor) and the GSM / GPRS Network. A GSM GPRS MODEM comprises of a GSM GPRS Module along with some other components like communication interface (like Serial Communication – RS-232), power supply and some indicators.

RELAY

A relay is an electromagnetic switch which is used to switch High Voltage/Current using Low power circuits. Relay isolates low power circuits from high power circuits. It is activated by energizing a coil wounded on a soft iron core.

DRIVE CIRCUIT

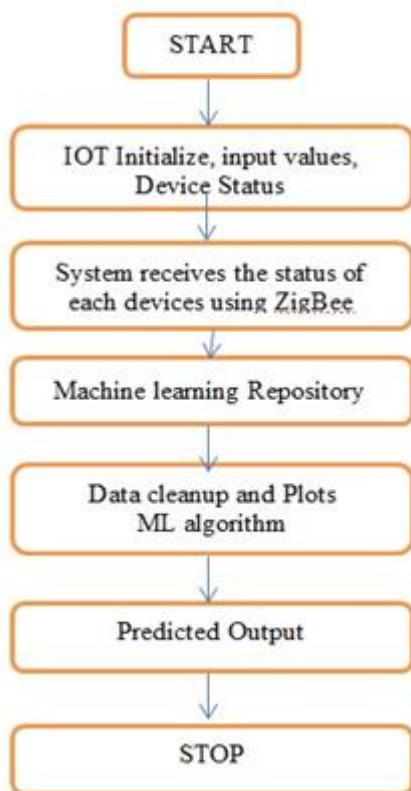
The relay driver circuit using an NPN transistor is given below. Transistor is used as a switch in this circuit. The microcontroller provides High or low input signals to NPN transistors. NPN transistor provides high driving current to electromechanical relay through the 12-volt external power supply.

BUZZER

1 shows how to interface the Buzzer to microcontroller. A piezoelectric element may be driven by an oscillating electronic circuit or other audio signal source, driven with a piezoelectric audio amplifier. ... When the input port pin from microcontroller is changed, the sound wave is changed in Buzzer.

V. IMPLEMENTATION FLOW

5.1 Flow Chart



5.2 Conclusion Future

Current 'I'	Change in Current 'Delta I'	Validation	Label of Validation Real '1', Fake '2'
5.7	0	Real	1
-6.3	-9.1	Fake	2

VI. FUTURE ENHANCEMENT

Generally, the proposed method enhances the reliability of the smart IoT systems, which increases the investments in industry 4.0. Besides, it can be applied to different kinds of sensors and machines in future work.

Specifically, large-scale machine to-machine communication (M2M) and the IoT are combined for improved automation processes, superior communication and self-monitoring, and assembly of intelligent machines that can solve issues without the requirement of human interference.

VII. CONCLUSION

So this communication protocol not only improves power efficiency of the sensors but also it runs the Best Effort services. IOT connect anything on the internet using a specified protocol with sensors, devices, equipment to transfer the information & to communicate among devices intelligently to achieve smart monitoring and administration.

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BIOGRAPHY



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